Beautiful Skin



The *epidermis* is the outermost of the three layers that comprise the skin. It consists of skin cells arranged in layers: mostly keratinocytes (~90%), but also melanocytes and Langerhans cells. From proliferating cells at the bottom layer (stratum basale) to the terminally differentiated dead cells of the uppermost layer (stratum corneum), they undergo a transformation over several weeks called keratinization. The epidermis performs the essential role of protective barrier for the body against the outside world. Most active ingredients are unable to pass the epidermis or even the stratum corneum to reach their target due to many physiochemical hurdles.

Melanocytes are specialized cells located at the base of the epidermis, the stratum basale. These dendritic cells supply the surrounding keratinocytes with the UV-protective skin pigment melanin through vesicles called melanosomes. Hyperpigmentation can occur, for instance, through melanocyte over-activity as a result of lifelong UV exposure (age spots), hormonal influences, and inflammatory processes such as acne and injuries.

> The *extracellular matrix* (ECM) is a structurally stable composite of fibrous proteins (mainly collagen and elastin) that contribute to the skin's mechanical properties, like firmness and elasticity. Their components are secreted by fibroblasts in the *dermis*. The ECM is continuously remodeled, and a balance between its production and degradation is of great importance. In aged skin, matrix metalloproteinases (MMPs) are up-regulated, leading to destruction of the ECM and eventually to loss of the skin's structural integrity.

Epidermal *desquamation*

is a natural and healthy process of the skin. It involves the invisible shedding of dead skin cells from the uppermost sheets of the stratum corneum as the final step of the keratinization/cell renewal process. The cell-cell junctions responsible for cell cohesion (corneodesmosomes) are gradually degraded by specialized proteases, and this complex process is carefully orchestrated by pH and hydration gradients in the stratum corneum.

> The stratum corneum comprises 15–20 layers of corneocytes that are embedded in an intercellular lipid matrix ("brick and mortar" model). These lipids are arranged in stacked bilayer sheets and consist mainly of ceramides, cholesterol, and fatty acids. They are an integral part of the *skin barrier* function. This prevents bacteria, chemicals, and particles from entering the skin, and also protects the water reservoir of the dermis by keeping transepidermal water loss (TEWL) at a healthy and low level. Imbalances of the skin barrier homeostasis at the epidermal level are very common in everyday life, e.g. through sun exposure, climatic conditions (cold/dry), psychological stress, and contact with chemicals. An impaired skin barrier can result in dry skin, scaling, itching, and discomfort.

The

pilosebaceous

apparatus consists of a hair follicle, the arrector pili muscle and the sebaceous gland. The hair is made of 95% keratin, a fibrous, helicoidal protein particularly rich in cysteine, which allows for covalent crosslinks and gives the hair its well-known mechanical stability. The outermost part of the hair (cuticle) is covered in flat cells arranged like scales, strengthening and protecting the hair shaft.

The sebaceous gland secretes **Sebum**, a complex mixture of triglycerides and fatty acids covering and lubricating hair and skin. On the skin surface, a hydrolipidic film is formed by a mixture of sebum, sweat and keratinized skin cells. This results in a natural emulsion on the surface of the skin and comprises another important part of the skin barrier in addition to the intercellular "mortar".

1 *Improved active penetration*

BergaCare SmartLipids are tiny solid "droplets" (<1 µm size), composed of many solid and liquid lipids and with active ingredients encapsulated within. They adhere perfectly to the skin surface and reinforce the natural skin barrier, while maintaining a controlled and prolonged release. Furthermore, the penetration of active ingredients is enhanced by the formation of a semi-occlusive patch in combination with the skin temperature. **BergaSom** enhances the penetration of actives thanks to its high affinity to skin lipids.

2 Whitening through reduction of melanocyte activity

Glabridin is a well-known natural whitening agent, but its poor solubility and bioavailability make it difficult to formulate in an effective way. The semi-occlusive film of the delivery system **BergaBright SmartLipids Glabridin** leads to a patch effect, which helps glabridin

penetrate the skin much better. It can reach the stratum basale to act on the melanocytes and inhibit melanin synthesis through blocking tyrosinase, a key enzyme in melanin biosynthesis.

3 Anti–wrinkle effect through maintenance of the ECM

Improving the quality of the extracellular matrix (ECM), a network of mainly collagen and elastin fibres, leads to more youthful skin and reduced wrinkles. **BergaCare SmartLipids Retinol, BergaCare SmartLipids Bakuchiol and BergaSom** are (among many other beneficial effects) able to positively influence the quality of the ECM via different biochemical pathways, including the inhibition of matrix metalloproteinases, which in turn inhibits the degradation of the ECM.



4 Promotion of desquamation and cell turnover

Being the smallest alpha-hydroxy acid, **GlyAcid®** can easily penetrate the stratum corneum. It promotes the desquamation of skin cells, allowing new, fresh skin cells to appear on the surface and supporting the cell renewal process. Younger-looking and radiant skin is the result. To provide care to that fresh skin, the **BergaCare FG range** of natural, fast-absorbing silicone alternatives is the ideal choice.

6 Beautiful hair and healthy sebum

GlyAcid® is able to close the cuticle of the hair, to give a smoother hair surface that is better able to retain moisture, shinier, easier to manage and less brittle. Furthermore, it prevents the formation of ingrown hair and unclogs pores to prevent trapping of dead skin cells, excess sebum, and dirt. To prevent acne, good sebum quality is essential. BergaSom, phospholipid complexes from sunflower or soy with a high content of phosphatidylcholine, help to provide important building blocks to fluidize the sebum and to keep it in good condition.

5 Skin barrier protection

The skin barrier is of great importance for healthy skin. It protects the skin from outer aggressions and from losing too much moisture. **BergaCare SmartLipids Ceramide** provide valuable building blocks identical to those in the skin – ceramides, phyto-cholesterol and fatty acids – that make up the natural skin barrier. **BergaSom H** are high-tech phospholipids able to form 2D lamellar structures that strongly resemble the intercellular barrier lipids. **BergaMuls ET 1** is the ideal 0/W emulsifier based on fruit and cereal fibre, and does not affect the skin barrier negatively like other common emulsifiers.





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